Zero Retries issue 0045 2022-05-06

Technological innovation in Amateur Radio - Data Communications; Space; Microwave… the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios - Bob Witte K0NR. Ultimately, amateur radio must prove that it is useful for society - Dr. Karl Meinzer DJ4ZC. We are confronted by insurmountable opportunities! - Pogo. Nothing great has ever been accomplished without irrational exuberance - Tom Evslin. Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ. What's life without whimsy? - Dr. Sheldon Cooper.

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

Steve Stroh N8GNJ, Editor

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Request To Send

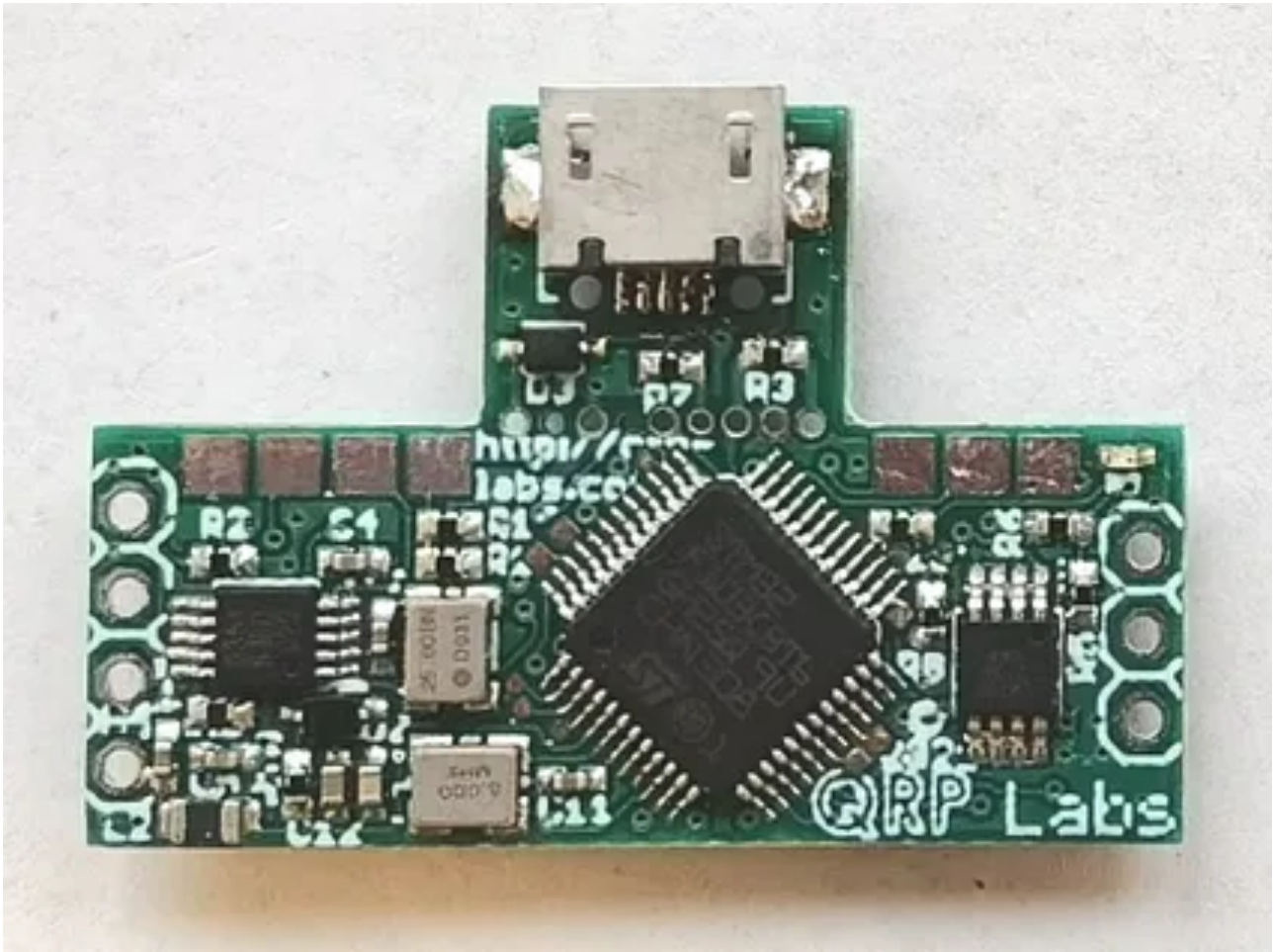
Countdown to Hamvention 2022 - May 20-22, in Xenia, Ohio:
~~24~~ ~~23~~ ~~22~~ ~~21~~ ~~20~~ ~~19~~ ~~18~~ ~~17~~ ~~16~~ ~~15~~ ~~14~~ ~~13~~ ~~12~~ ~~11~~ ~~10~~ ~~09~~ ~~08~~ ~~07~~ ~~06~~ ~~05~~ ~~04~~ ~~03~~ ***02*** weeks…

Greetings from various comfortable hotel rooms along Interstate 90 in various Western states. While this trip includes Amateur Radio (Hamvention), it's not *about* Amateur Radio. My wife Tina Stroh KD7WSF are determined to just *enjoy ourselves* on this trip.

My apologies to those who have offered input on various LoRa and LoRaWAN systems that are applicable to, or adjacent to Amateur Radio. I really do plan to do a Zero Retries deep dive based on your contributions, but I need the resources of my office to really get that information together reasonably, not just a laptop in a motel room. Look for it sometime this Summer.

de Steve N8GNJ

QRP Labs U4B Balloon Tracker



QRP Labs U4B. Image courtesy of QRP Labs

My thanks to Jeff Davis KE9V for pointing this out to me.

When I quickly read through the features list of the QRP Labs U4B, I couldn't think of any ideas I would have for a balloon tracker that wasn't already incorporated (not that I have *any* experience Amateur Radio / experimental / High Altitude balloon launches):

> The "U4B" (Ultimate4 for Balloons): low cost [$59], lightweight, feature-packed flexible high altitude balloon tracker with applications for hobbyists, researchers, education and more. The PCB is ready assembled, weighing only 1.8g and measuring just 33.0 x 12.7mm (without USB protrusion - remove before flight).

Then I read more completely and saw this explanation for the incredibly complete set of features:

> U4B hardware, firmware and the telemetry-over-WSPR protocol was developed by QRP Labs with extensive collaboration with Dave [Beverstein] VE3KCL, who launched 83 test flights from June 2015 to April 2022. I''s both the longest QRP Labs product development program, and the most tested, by far!

The (maximum) power output is approximately 27mW, it uses a temperature stabilized crystal oscillator (TXCO) for frequency stability (it gets cold at balloon altitudes) and the frequency coverage is "2200m to 2m" - 136 kHz through 144-148 MHz.

> The U4B radio transmitter can transmit the following modes:
>
> - QRP Labs tracking and telemetry over WSPR
> - WSPR (including extended mode and slow 15-minute WSPR)
> - JT9 (1, 2, 5, 10, 30 minutes)
> - JT65 (modes A, B, C) Hellshreiber (standard, DX, and slow multi-tone FSK)
> - CW (standard speed, QRSS, FSKCW and DFCW)
> - Customized "Glyph" patterns can produce a unique idenfier on QRSS

But *Wait*, there's ***More!*** QRP Labs has allowed (*encouraged!*) expansion of the hardware (additional sensors, etc.) and software, and documented it all very well in a hardware manual and operating manual. From the QRP Labs mailing list (must be subscribed to see individual messages):

> U4B has a 32-bIt ARM processor running QDOS with a 32-bit Virtual Machine that runs a kind of simplified BASIC programming language; it's like a miniature computer, with a 128K disk (on 128K EEPROM chip), an Si5351A as the transmitter (9mW or 27mW selectable output power), any LF/MF/HF/VHF band operation. There's a full-screen text editor with integrated compiler and debugger, file manager, and command line console. Of course it has an onboard GPS too. U4B uses the QRP Labs Firmware Update (QFU) - as also seen on QDX and QLG2 - so you can simply update the firmware on any OS without drivers, software or hardware - the U4B just appears as a USB Flash drive and you download and copy in the new firmware file. It can be flown as simply as just configuring your callsign, using the pre-installed simple tracking program. Or you can make it as complex as you like, with your own BASIC programs.

All for $65, 1.8 grams, very small form factor, and what's undoubtedly a very, very small power budget.

My description here is a cursory list of features and capabilities for this unit.

What strikes me about the U4B is that it's *so* capable, *so* small, *so* power-efficient that it could be used for many other projects other than balloon flights. Imagine wanting to monitor something (that otherwise doesn't have communications capability). Just one (imaginary) example is a sixth grade classroom planting a tree on a mountain and the class wants to monitor the tree's environment - hours of sunlight, moisture levels, temperatures, etc. Another example might be a monitoring a tree on a very small, normally inaccessible islet in a nearby body of water. That's all easily doable with the U4B. The advanced data modes in the U4B include Forward Error Correction (FEC) so the 27 mW power level will probably be adequate, and decent simple, inexpensive, durable wire antennas could be constructed. And, a simple receiver could be set up in the classroom using a Software Defined Receiver.

The U4B is an impressive accomplishment and a great example of technological innovation in Amateur Radio. It's definitely in the running for a future Zero Retries Award for Technological Innovation in Amateur Radio.

New Amateur Radio Open Source Organization - Ham Open

I spotted this on Twitter 2022-04-25 by Bruce Perens K6BP. This is a very interesting development in Open Source Amateur Radio.

> I have the IRS 1023 form in hand for http://HamOpen.org (no web site yet) to become a 501(c)3, and will file it once California grants our corporation registration. This is to support Open Source development for Radio Amateurs. We have a table in Building 2 at Hamvention.

Since then, the website is up:

> **Ham Open – Facilitating the development of Open Source software for Amateur Radio**
> HamOpen.org is the name of our organization. Our purpose is to act as an [umbrella] 501(c)3 for funding of Open Source projects for Amateur Radio. We are a registered Public Benefit Non-Profit Corporation in the state of California. We will exhibit in Building 2 at the Dayton Hamvention. So far, we are hosting the M17 project (Open Source Digital Voice), Applied Ion Systems (Electric Thrusters for Satellites), and the $14 Remote Rig Controller [see ZR > BEACON below]. We have room to show your Open Source project. We'll be doing a membership drive at Hamvention. To raise funds for Open Source projects, we must navigate the IRS Public Support Test, which means that we must collect 1/3 of our funds from small donations. We can't do it all with large grants. We are filing our 1023 application to be a 501(c)3 with the IRS. We had that professionally prepared. But the IRS will probably take months to approve it. There will be more information as there is time to develop the web site. Meanwhile, please write to bruce at perens dot com if there are questions.

Open Research Institute (ORI) also lists the M17 Project on *their* Projects page. I have no inside information from K6BP, ORI, or M17 Project about this… development. Disclaimer - ARDC provided a $250k grant to M17 Project via ORI in 2021 while I was a member of the ARDC 2021 Grants Advisory Committee (GAC). I have not had any discussions with ARDC about M17 Project other than participating in a recommendation to fund M17 Project's grant proposal.

Open Source is a good thing. Open Source in Amateur Radio is a good thing. An organization (at least in name) totally dedicated to Open Source in Amateur Radio seems to be a good, possibly great thing. I hope to learn more at Hamvention. This will be an interesting story to follow.

I'm not implying that Ham Open is / will be involved in advocating for Amateur Radio regulatory reform… but I'll make two observations:

- K6BP is *one of the few that has done some deep thinking* about such things - see his very insightful 2017 Comments in ET Docket No. 17-215.
- ***No… one… (or organization)… is… doing… so. Even the organization with the multi-million dollar "Spectrum Defense Fund".***

If Ham Open announced that they were going to engage in advocacy for Amateur Radio Regulatory reform, I'd be an early, frequent, and generous contributor.

ZR > BEACON

- **IARU R1 wants you to #BePartOfTheFuture**
  My thanks to Pseudostaffer Dan Romanchik KB6NU for mentioning this.
  More and more, I'm impressed by what [International Amateur Radio Union - Region 1 - IARU R1] is doing for amateur radio. The latest is their Ham Challenge 2022. The challenge is for hams to come up with game-changing idea that will attract more people to amateur radio and make amateur radio more fun for those already involved. According to the official rules, [IARU R1] expects you to come with new ideas that we will help you to bring to reality. The winning teams or individuals will bring their ideas to life in partnership with the amateur radio community. The International Amateur Radio Union Region 1 (IARU R1) will provide guidance for these projects and will support them financially. <snip>
  IARU Region 1 is Africa, Europe, Middle East, and northern Asia. "The Americas" is Region 2.

- **New Amateur Radio book - Software Defined Radio Transceiver: Theory and Construction of the T41-EP Amateur Radio**
  My thanks to Jeff Davis KE9V for mentioning this.
  Published April 4, 2022 by Albert Peter AC8GY and Dr. Jack Purdum W8TEE. *This book combines Software Defined Radio (SDR) and Digital*

Signal Processing (DSP) principles into a single, readable, form and uses that knowledge to build the T41-EP; a 20W, HF 5 band, CW/SSB transceiver (SDT) with features not always found in commercial radios costing ten times as much.The T41-EP is a self-contain SDT that does not require an external PC, laptop, or tablet to use. The T41-EP is powered by the powerful Teensy 4.1 microcontroller, which is programmable using the free Arduino IDE. The EP stands for Experimenter's Platform because the T41-EP is designed around 7 small printed circuit boards. <snip>

- **Using the TARPN NinoTNC in a Packet Radio / Winlink Network in Michigan**
  From Tom Bosscher K8TB on the ninotnc@groups.io mailing list, in reply to a question / suggestion that TARPN consider building a version of the NinoTNC as a Raspberry Pi HAT:
  A bunch of us in Michigan saw the TARPN Nino for what [it] was, a very clever, extremely well designed modem/tnc. So easy to configure and use in the BPQ nodes. The 25+ site Michigan Mi7 packet/Winlink system has a lot of Nino's installed. But wait, there's more. Don't know how or who, but it was discovered that you can take that really cute, and did I say, extremely well designed Nino, and plug it right into any Windows PC or laptop, bring up Winlink, and tell Winlink you have a KISS modem at port XX at 57,600 baud, and you now have a Winlink station, no muss, no fuss. My county ecom group is changing all of their packet stations to the Nino just for this alone. So even if you buy a Nino built (W4CSN is going a great job on Etsy with those), for the tnc and case you are talking about $ 75.00 One and done. I'm demonstrating how easy it is to get on Winlink at ham club meetings and hamfests, and the demonstration is using the Nino tnc plugged into my laptop. Being doing this ham stuff for 55 years now. I have 3 Nino's on my desk here, another 8 downstairs, all headed for places far far away. TARPN did a great job, one very bright light in the ham radio hobby/service.
  I've written about the NinoTNC previously in Zero Retries. The NinoTNC is a capable *hardware* TNC with a USB interface, 1200 / 2400 / 4800 / 9600 air data rates, and backwards compatibility with legacy AX.25 and a new protocol called Improved Layer 2 Protocol (IL2P) that integrates Forward Error Correction (FEC). I've also mentioned that I could foresee uses of the NinoTNC beyond the network architecture that TAPRN promotes. I'm glad to read that K8TB and the Mi7 / Winlink RMS/Relay Network has proven out such expanded use of the NinoTNC.

- **Appalachian Trail Golden Packet Event - 2022-07-16**
  John Langner WB2OSZ on the aprssig@tapr.org mailing list:
  The Appalachian Trail Golden Packet event is an annual tradition started by [Bob Bruninga] WB4APR [Silent Keyboard] in 2009. The goal is to set up 15 temporary VHF/UHF APRS stations on mountain tops, along the Appalachian Trail, and send messages end to end between Georgia and Maine. This year it is on July 16. For more information, see https://atgoldenpacket.net/ and join the discussion https://atgp.groups.io/g/main.

- Zero Retries 0043 got a **nice incidental mention on Reddit**. My thanks to Bob Witte K0NR for mentioning this.

- Spotted on Twitter - (Bruce Perens K6BP) **Github project K6BP RigControl**
  This is the K6BP RigControl software, an Amateur Radio transceiver controller using an ESP-32 Audio Kit card commonly sold on AliExpress for around $14. Search for sales on AliExpress. RigControl connects to the internet via WiFi, sets itself up with a public web address, and provides a web-based interface to control an amateur radio transceiver.

Updata

- **Hamvention Forums** - Detailed descriptions the Forums have now been posted - Friday, Saturday, Sunday.

- As part of the TAPR's one hour and twenty minute Forum, John Hays K7VE will be talking about Amateur Radio Digital Communication's grants. It's a highly personal opinion, but I think it's… regrettable… that the largest Amateur Radio conference in the US can't make room for a dedicated Forum for the largest source of Amateur Radio grant funding in the US.

Feedback Loop

- Thanks to John Hays K7VE and Chris Sullivan VE3NRT for feedback on Zero Retries 0044 - scroll to the bottom for their comments.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*

- Pseudostaffer Dan Romanchik KB6NU for continuing to spot, and write about "Zero Retries Interesting" items on his blog that I don't spot on my own.

- Southgate Amateur Radio News consistently surfaces "Zero Retries Interesting" stories.

- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

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More bits from Steve Stroh N8GNJ:

- SuperPacket blog - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted in beautiful Bellingham, Washington, USA
2022-05-06

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